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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/971,777	10/05/2001	Stephen E. Silverman	76141.00101	2498

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EXAMINER	
OPSASNICK, MICHAEL N	
ART UNIT	PAPER NUMBER
2655	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/971,777	Applicant(s) SILVERMAN ET AL.	
	Examiner Michael N. Opsasnick	Art Unit 2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shubha et al ("Application of the Wavelet......") in view of France et al ("Acoustical Properties of Speech as Indicators of Depression.....").

As per claim 1, Shubha et al ("Application of the Wavelet......") teaches:

A. setting an analysis window to a selected sample set length of 512, where the particular sample is identified as the Kth sample	Setting window length to L ms. (page 918, 2nd column, last paragraph and FIG. 1)
B. reading the Kth sample	(2nd step, FIG. 1)
C. computing wavelet transforms of such Kth sample for scales in powers of 2 running from the 1st power to the 5th	computing DyWt for scales in powers from 3rd to 5th (page 919, 1st column, 3rd paragraph)
D. storing the signal energy value as computed for each scale	inherently part of the algorithm disclosed in Fig. 1, since these values must be stored in computer memory for further comparisons.
E. checking to determine whether the Kth sample is the last of the sample set and if additional samples remain, repeating steps "b" through "d"	See Fig. 1, algorithm iterates through all segments.
F. setting the median energy distribution at the scale for 2 to the 4th power as a threshold	Threshold is set as 2 to 4th (page 919, second column, 2nd paragraph)

G. successively for each sample comparing the energy across the scales	(See FIG .1 and page 919, 1st column, last paragraph) - "... in addition to checking whether the local maxima in DyWT correlates across two scales."
J. if the segment energy at the 2 to the 4th power scale exceeds the threshold, classifying the segment as voiced otherwise classifying it as silence.	Page 919, 2nd column, 2nd paragraph.

Shubha et al. do not disclose:

A. setting an analysis window to a selected sample set length of **512**
C. computing wavelet transforms of such Kth sample for scales in powers of 2 running from **the 1st power to the 5th**
H. if the maximum energy is at the scale for 2 to the 1st power, identifying the segment as unvoiced and proceeding to the next succeeding sample
I. if the segment maximum energy is at one of the scales of 2 to the 2nd power through 2 to the 5th power, identifying the segment as being either voiced or silence

Regarding step A, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Shubha et al. to use sample set length of 512. Applicant has not disclosed whether any specific set length provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Shubha et al. to perform equally well with other sample set lengths because varying sample set length in Shubna et al. would only change processing requirements of the system, but would not affect the essence of Shubna et al's invention.

Regarding steps C, H and I, Shubna et al. do emphasize that voiced speech is usually present at 3rd to 5th scales, while unvoiced speech is only present at lower scales (p. 919, Col. 1, last paragraph). Since Shubna et al. do not try to accomplish full voiced/unvoiced/silence determination, they only attempt to find voiced parameters at the higher scales (3rd -5th). However, the above disclosure is sufficient to deduce that unvoiced frequencies exist at scales in powers of 2 running from 1st power to 2nd power. In addition, one of ordinary skill in the art could deduce that since the voiced segments exist at or above 2 to the 4th power (voice) and unvoiced segments exist at or below 2 to the 2nd power, then by process of elimination, signals falling in between these thresholds must represent silent periods. Finally, Applicant's specification and other claims indicate that the disclosed invention uses only voiced segments and discards the classified silence/unvoiced segments, so there does not appear real utility from further distinguishing within the unvoiced/silence category.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Shubna et al. to perform voiced/unvoiced/silence computation based on the principles disclosed by Shubna et al. This would allow the system to distinguish between silence, voiced and unvoiced segments in order to remove silence/unvoiced segments which are not useful for fundamental frequency (pitch) calculations (p. 919, Col. 1, last paragraph) (as it is well-known in the art, unvoiced speech is not periodic and thus is not useful for pitch estimation).

Shubha et al does not explicitly teach using these voicing parameter estimations to make a determination regarding near-term suicidal risk, however, France et al teaches using such estimations for determining suicidal groups (Table 8). Therefore, it would have been obvious to one of ordinary skill in the art of voice recognition at the time the invention was made to modify al to be used for suicidal risk evaluation because it would advantageously warn of impending suicide versus depression (France et al ("Acoustical Properties of Speech as Indicators of Depression….."), abstract).

3. Claims 2,3,6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Shubha et al ("Application of the Wavelet……") in view of Parson ("Voice and Speech Processing") in further view of France et al ("Acoustical Properties of Speech as Indicators of Depression…..").

As per claims 2,6, Shubha et al ("Application of the Wavelet……") teaches:

A. setting an analysis window to a selected sample set length of 512 where the particular sample is identified as the Kth sample	Setting window length to L ms. (page 918, 2nd column, last paragraph and FIG. 1)
B. computing the wavelet transform for the sample set at scale 2 to the 4th power, with a scale factor defined by the quotient of the wavelet center frequency at level 0 and the desired center frequency	Threshold is set as 2 to 4th (page 919, second column, 2nd paragraph)
C. selecting two consecutive segments of the vocal signal of such person which are voiced segments and generating separate pulse trains in which the heights of the pulses correspond to amplitude of positive and negative peaks of the wavelet transformed speech signal	(See FIG .1 and page 919, 1st column, last paragraph) - "... in addition to checking whether the local maxima in DyWT correlates across two scales."
D. thresholding the segments of the vocal signal to discard peaks corresponding to possible unvoiced samples	Only voiced samples are used for pitch estimation (see FIG. 1, "segment is unvoiced, set pitch period to 0" block)

E. v. taking the difference between two consecutive prominent pulses as the duration for the glottal cycle	(page 919, Col. 1, 1st paragraph)

Shubha et al. do not disclose:

A. setting an analysis window to a selected sample set length of **512**

E. computing a fundamental period over the entirety of each of the two segments by:

i. finding the location of the first peak of the autocorrelation of the smoothed spectrum to the right of the zero lag component

ii. detecting a starting pulse exhibiting the property of being larger than both the pulse immediately preceding and immediately following such pulse and being greater than 50% of the global maximum of the pulse sequence

iii. locating following prominent pulses as detected in the neighborhood of expected locations determined by the peak of the autocorrelation sequence

iv. selecting, between two sequences of positive and negative peaks, the peak having the largest magnitude

and v. taking the difference between two consecutive prominent pulses as the duration for the glottal cycle

F. determining period-to-period fluctuation of fundamental frequency as the inverse of said glottal cycle for said two consecutive prominent pulses.

Regarding step A, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Shubha et al. to use sample set length of 512. Applicant has not disclosed whether any specific set length provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Shubha et al. to perform equally well with other sample set lengths because varying sample set length in Shubha et al. would only change processing requirements of the system, but would not affect the essence of Shubha et al's invention.

Regarding steps E and F, Shubna et al. disclose computing the fundamental frequency as the inverse of time interval between local peaks (Shubna et al., page 919, Col. 1, 1st paragraph.) The method of finding the peaks using harmonic-peak-based detection is well-known in the art. For example, "Voice and Speech Processing" by Thomas Parson describes this method on pages 205-206. Firstly, Parson teaches that filtered (smoothed) autocorrelation of signal spectrum points to the approximate location of Fo (pages 198-199). Parson also teaches that "harmonic peaks occur at integer multiples of the pitch frequency (Fo)" and that "the differences in peak frequencies are integer multiples of the pitch frequency." As a result, harmonic-peak-based detection proceeds by searching for peaks in the range of the estimated peach (from autocorrelation) and fine-tuning the results by finding the maximum peaks within these regions (see the discussion of several different methods of pages 205-206, such as Snow and Hughes).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Shubna et al. to compute the fundamental frequency using a well-known method of harmonic-peak-detection (see Parson's book) in order to fine-tune the selection of peaks and thus establish the best fundamental frequency estimate.

Steps A-J represent the determination of the voice segments (see claims 1,7). Steps K-O represent pitch estimation which requires voice samples (as required by step L). Therefore, steps A-J are rejected for the same reasons as steps A-J in claims 1(7). Steps K-O are rejected for the same reasons as steps B-F in claim 2(6).

The combination of Shubha et al ("Application of the Wavelet......") in view of Parson ("Voice and Speech Processing") does not explicitly teach using these voicing parameter estimations to make a determination regarding near-term suicidal risk, however, France et al ("Acoustical Properties of Speech as Indicators of Depression.....") teaches using such estimations for determining suicidal groups (Table 8). Therefore, it would have been obvious to one of ordinary skill in the art of voice recognition at the time the invention was made to modify the combination of Shubha et al ("Application of the Wavelet......") in view of Parson ("Voice and Speech Processing") to be used for suicidal risk evaluation because it would advantageously warn of impending suicide versus depression (France et al ("Acoustical Properties of Speech as Indicators of Depression....."), abstract).

4. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over France et al ("Acoustical Properties of Speech as Indicators of Depression.....").

As per claims 4,5, France et al teaches:

A method for assessing near-term suicidal risk through voice analysis independently of verbal content of the voice, comprising:	See title of the article
eliciting a voice sample from a person to be evaluated for near- term suicidal risk and converting said sample into electronically processable signal form	(page 832, part B., second paragraph from the buttom: "Approximaately 2 min and 30 s of unedited speech ...)
time-wise dividing said signal into segments according to whether the person was silent, speaking voiced words or making unintelligible unvoiced sounds	dividing signal into segments (same reference as above)
if there are two consecutive voiced segments, measuring fundamental frequency for each of said two segments	measuring Fo for each segment (page 833, first and second paragraphs)
(**partially**) comparing the *difference in measured fundamental frequency to fundamental frequency difference data* (not disclosed) for known near-term suicidal risk persons, known depressed persons not at near-term suicidal risk and non-depressed persons from a control group, to determine whether the person is at near-term suicidal risk or is merely depressed.	Differences in Fo statistics were examined for control, major-depressed and high-risk (suicidal) groups (Table 8)

France et al ("Acoustical Properties of Speech as Indicators of Depression.....") does not explicitly teach using "difference in measured fundamental frequency for said two segments" as an indication of suicidal tendencies (claim steps D and E).

However, France et al ("Acoustical Properties of Speech as Indicators of Depression.....") suggests measuring Fo range for each 20 second segment (2nd paragraph, pg 833). The range of a set of data is the difference between the highest and lowest values in the set. Here, the 20 second segment would undoubtedly contains several (2 or 3) voiced segments, since Fo can only be measured for voiced segments and 20 seconds is too long of a duration for a single voiced segment (short of a long scream, but certainly no common in speech recoded during a therapy session). As a result, the Fo range over the 20 second window would represent the Fo difference of two segments in case where there are only two voiced segments in the said 20 second window. In addition, France et al ("Acoustical Properties of Speech as Indicators of Depression.....") does discuss measuring jitter (fundamental frequency differences) for Fo in their article ("II. Previous Work", page 830).

As a result, it would have been obvious to one of ordinary skill in the art at the time the invention of made to modify France et al ("Acoustical Properties of Speech as Indicators of Depression.....") to use "difference in measured fundamental frequency for said two segments" (jitter) as another statistic for attempting to determine whether the person is predisposed to suicide, as the article of France et al ("Acoustical Properties of Speech as Indicators of Depression.....") indirectly suggests the use of this statistic for one of ordinary skill in the art.

Response to Arguments

5. Applicant's arguments filed 2/9/2005 have been fully considered but they are not persuasive. As per the applicant's arguments that the Shubha & Parsons references do not teach new element K, examiner argues that these arguments are moot in view of the new grounds of rejection. As per the arguments against the France et al reference, examiner argues that the category of unintelligible voice sounds fall into the category of unvoiced speech as discussed by France et al.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks
Washington, D.C. 20231
or faxed to:
(703) 872 9314,
(for informal or draft communications, please label "PROPOSED" or "DRAFT")
Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Opsasnick, telephone number (571)272-7623, who is available Tuesday-Thursday, 9am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Wayne Young, can be reached at (571)272-7582. The facsimile phone number for this group is (571)272-7629.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group 2600 receptionist whose telephone number is (571) 272-2600, the 2600 Customer Service telephone number is (571)272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

W. R. YOUNG
PRIMARY EXAMINER

mno
6/11/05